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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,585	04/09/2004	Aamod Khandekar	030304	1901

23696 7590 04/16/2007

QUALCOMM INCORPORATED
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EXAMINER	
MALEK, LEILA	
ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	04/16/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/821,585	KHANDEKAR ET AL.	
	Examiner	Art Unit	
	Leila Malek	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21, 25-27, 31, 35-37* is/are rejected.

7)☒ Claim(s) *22-24,28-30 and 32-34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on 02/20/2007 have been fully considered but they are not persuasive.

Applicant's Argument: Applicant argues, on page 12, lines 2-17, that Bjerke does not disclose the limitation "deriving LLRs for code bits of a second data stream based on the LLRs for the code bits of the first data stream and the estimated interference" as cited in claim 1.

Examiner's Response: Examiner asserts that, regarding to the above limitation, Bjerke discloses that the result of the first LLR computer 452a (see Fig. 4C) has been provided to the first decoder 440a and the output of the decoder has been provided to the first interference canceller 460a. Bjerke further discloses that assuming that the data for the first stage has been decoded correctly, the contribution of these decoded bits on the received modulation symbols is derived and subtracted from that stage's input vectors to derive the input vectors for the next stage (See paragraph 0159). Therefore, Bjerke discloses deriving LLRs for code bits of a second data stream based on the LLRs for the code bits of the first data stream and the estimated interference.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1-3, 5-9, 11-13, 15-18, 20, 21, 25, 27, and 31 rejected under 35 U.S.C. 102(a) as being anticipated by Bjerke et al. (hereafter, referred as Bjerke) (US 2003/0103584).

As to claims 1, 12, and 16, Bjerke discloses a method/apparatus for performing data detection in a wireless communication system (see paragraph 0001), comprising; deriving log-likelihood ratios (LLRs) for code bits of a first data stream based on received symbols for a data transmission (see paragraphs 0028, 0158-0159, Figs. 1 and 4c); estimating interference due to the first data stream (see block 460a); and deriving LLRs for code bits of a second data stream based on the LLRs for the code bits of the first data stream and the estimated interference (see block 452b).

As to claims 2, 13, and 17, Bjerke discloses decoding the LLRs for the code bits of the first data stream to obtain decoded data for the first data stream (see paragraph 0158); and re-encoding and remodulating the decoded data to obtain remodulated symbols for the first data stream (see Fig. 1, blocks 180 and 182), wherein the interference due to the first data stream is estimated based on the remodulated symbols (see paragraph 0161).

As to claims 3 and 18, Bjerke shows that the LLRs for the code bits of the first data stream are derived from the received symbols in real-time without buffering the received symbols (Figs. 1 and 4c).

As to claim 5 Bjerke discloses that the quadrature phase shift keying (QPSK) is used for both the first and second data streams (see paragraphs 0009 and 0036).

As to claim 6, Bjerke discloses that a modulation scheme with a higher order

than quadrature phase shift keying (QPSK) is used for the first data stream (see paragraph 0009), wherein the method further comprising: deriving received symbol estimates based on the LLRs for the code bits of the first data stream, and wherein the LLRs for the code bits of the second data stream are derived based on the received symbol estimates and the estimated interference (see paragraph 0161 and Fig. 4c).

As to claim 7, Bjerke discloses that deriving received symbol estimates includes forming two equations for each received symbol based on LLRs for all code bits of a data symbol carried in the received symbol for the first data stream, and wherein a received symbol estimate for the received symbol is derived from the two equations (see paragraphs 0105-0133).

As to claim 8, Bjerke discloses that the LLRs for the code bits of the first and second data streams are derived based on a dual-max approximation (see paragraphs 0010 and 0137).

As to claims 9 and 15, Bjerke further discloses deriving channel gain estimates for a wireless channel used for the data transmission, wherein the LLRs for the code bits of the first and second data streams and the interference due to the first data stream are derived with the channel gain estimates (see paragraphs 0089-0096).

As to claim 11, Bjerke discloses that the wireless communication system utilizes orthogonal frequency division multiplexing (OFDM), and wherein the received symbols are from a plurality of sub-bands (see paragraph 0004).

As to claims 20, 27, and 31, Bjerke discloses a method/apparatus for performing data detection in a wireless communication system (see paragraph 0001),

comprising; deriving log-likelihood ratios (LLRs) for code bits of a first data stream based on received symbols for a data transmission (see paragraphs 0028, 0158, Figs 1 and 4c); deriving data symbol estimates for the first data stream based on either the received symbols or the LLRs for the code bits of the first data stream (see paragraphs 0161 and 0166); estimating interference due to the first data stream based on the data symbol estimates (see block 460a); and deriving LLRs for code bits of a second data stream based on the received symbols and the estimated interference (see block 452b).

As to claim 21, Bjerke discloses that the data symbol estimates are derived by making hard decisions on either the received symbols or the LLRs for the code bits of the first data stream (see paragraph 0161).

As to claim 25, Bjerke shows that the LLRs for the code bits of the first data stream are derived from the received symbols in real-time without buffering the received symbols (Figs. 1 and 4c).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 4, 14, 19, and 26, are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjerke in view of Maru (US 6,516,444).

As to claims 4, 14, and 19, Bjerke discloses all the subject matters claimed in claims 1, 12, and 16, except for storing the LLRs for the code bits of the first data stream in a buffer; and storing the LLRs of the code bits of the second data stream in the buffer by overwriting the LLRs for the code bits of the first data stream. Maru discloses a turbo decoder apparatus (See Fig. 9), wherein previous information LOG likelihood and extrinsic information LOG likelihood are alternatively stored in a priori memories 103-1 and 103-2 (see Fig. 1). Maru further discloses that when one memory is used for a read as a previous information LOG likelihood memory, the other memory is used for a write as an extrinsic information LOG likelihood memory. In the next cycle, the memory used as a previous information LOG likelihood memory is overwritten as an extrinsic information LOG likelihood memory, and the memory used as an extrinsic information LOG likelihood memory is used for a read as a previous information LOG likelihood memory. It would have been obvious to one of ordinary skill in the art at the time of invention to modify Bjerke as suggested by Maru to reduce the number of buffers in the system by overwriting the recent information on the previous ones and make the system less costly.

As to claims 26, Bjerke discloses all the subject matters claimed in claims 20, except for storing the LLRs for the code bits of the first and second data streams in a buffer. Maru discloses a turbo decoder apparatus (See Fig. 9), wherein previous information LOG likelihood and extrinsic information LOG likelihood are alternatively stored in a priori memories 103-1 and 103-2 (see Fig. 1). Maru further discloses that when one memory is used for a read as a previous information LOG likelihood memory,

the other memory is used for a write as an extrinsic information LOG likelihood memory. In the next cycle, the memory used as a previous information LOG likelihood memory is overwritten as an extrinsic information LOG likelihood memory, and the memory used as an extrinsic information LOG likelihood memory is used for a read as a previous information LOG likelihood memory. Since Bjerke using the LLR value of the first data stream to compute the LLR value of the second data stream, therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Bjerke as suggested by Maru to use a buffer to save the LLR values of the previous data stream to support non-real-time LLR calculations.

4. Claims 10 and 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjerke in view of Leung (US 2003/0172114).

As to claim 10, Bjerke discloses a technique to detect and decode signals that may have been coded and modulated based on one or more coding and modulation schemes, e.g. as determined by the channel conditions (See paragraph 0006). Bjerke does not expressly disclose that the first data stream is a base stream and the second data stream is an enhancement stream for a hierarchical coded data transmission. Leung discloses a communication system (See paragraph 0092), wherein the base station is able to separate different levels of transmissions and then send the multiple transmission streams over distinct broadcast channels, each having a different QOS level. Leung further discloses that the base description layer (i.e. the base stream) is sent over a most reliable broadcast channel and may use relatively more power. Additionally, the base description layer may incorporate strong forward error correcting

codes to guarantee that the base stream is received correctly over the entire cell or sector. The enhancement layer (i.e. the enhancement stream) is then sent over a relatively less reliable broadcast channel using less power. The enhancement layer may implement weaker forward error correcting codes or may forego error checking. The channel on which the enhancement is transmitted is received by terminals in good radio conditions, i.e., high QoS, allowing these terminals to experience better quality content by using the enhanced description. Since Bjerke's technique used to detect and decode signals that may have been coded and modulated based on one or more coding and modulation schemes (e.g. as determined by the channel conditions), therefore it would have been clearly recognizable to one of ordinary skill in the art, that this technique will support transmission of base stream and enhancement stream in a hierarchical coded data transmission system as disclosed by Leung. Hence, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Bjerke as suggested by Leung to use base stream and enhancement stream instead of the first and second data streams to enhance the performance of the system (see paragraph 0092).

As to claim 35, Bjerke discloses a method/apparatus for performing data detection in a wireless communication system (see paragraph 0001), comprising; deriving log-likelihood ratios (LLRs) for code bits of a first data stream based on received symbols for a data transmission (see paragraphs 0028, 0158-0159, Figs. 1 and 4c); estimating interference due to the first data stream (see block 460a); and deriving LLRs for code bits of a second data stream based on the estimated

interference (see block 452b). Bjerke discloses that the above technique has been used to detect and decode signals that may have been coded and modulated based on one or more coding and modulation schemes, e.g. as determined by the channel conditions (See paragraph 0006). Bjerke does not expressly disclose that the first data stream is a base stream and the second data stream is an enhancement stream for a hierarchical coded data transmission. Leung discloses a communication system (see paragraph 0092), wherein the base station is able to separate different levels of transmissions and then send the multiple transmission streams over distinct broadcast channels, each having a different QOS level. Leung further discloses that the base description layer (i.e. the base stream) is sent over a most reliable broadcast channel and may use relatively more power. Additionally, the base description layer may incorporate strong forward error correcting codes to guarantee that the base stream is received correctly over the entire cell or sector. The enhancement layer (i.e. the enhancement stream) is then sent over a relatively less reliable broadcast channel using less power. The enhancement layer may implement weaker forward error correcting codes or may forego error checking. The channel on which the enhancement is transmitted is received by terminals in good radio conditions, i.e., high QoS, allowing these terminals to experience better quality content by using the enhanced description. Since Bjerke's technique used to detect and decode signals that may have been coded and modulated based on one or more coding and modulation schemes (e.g. as determined by the channel conditions), therefore it would have been clearly recognizable to one of ordinary skill in the art, that this technique will support

transmission of base stream and enhancement stream in a hierarchical coded data transmission system as disclosed by Leung. Hence, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Bjerke as suggested by Leung to use base stream and enhancement stream instead of the first and second data streams to enhance the performance of the system (see paragraph 0092).

As to claim 36, Bjerke discloses that the second computation unit is further operative to derive the LLRs for the code bits of the second data stream based on the LLRs for the code bits of the first data stream (See Fig. 4C and paragraph 0159).

As to claim 37, Bjerke further discloses that the second computation unit is further operative to derive the LLRs for the code bits of the second data stream based on the received symbols (See Fig. 4C).

Allowable Subject Matter

5. Claims 22-24, 28-30, and 32-34, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leila Malek whose telephone number is 571-272-8731. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Leila Malek
Examiner
Art Unit 2611

L.M

MOHAMMED GHAYOUH
SUPERVISORY PATENT EXAMINER